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ABSTRACT

A study was conducted in Wisconsin to determine which electronic technologies were currently in place, being implemented, and/or being considered for implementation in the state's 16 Vocational, Technical, and Adult Education (VTAE) districts. All 16 of the VTAE districts were surveyed in order to describe the electronic technologies currently being used at each institution, the extent to which the technologies have been implemented, and the details of these technologies. The results of the survey indicated that the 16 VTAE districts are substantially involved with 78 new and emerging electronic technologies. The degree of involvement varied among districts and included research, experimentation, operation, and significant experience with the technology applications. The most common applications within the VTAE system were word processing, computer-assisted design, optical scanning (grading, testing, etc.), internal closed-system educational television, and online student registration. More than 40 of the applications were in the areas of instructional delivery and classroom use, with the remainder being in administrative and student support. The least-implemented applications were low-power educational television, call-up educational programming, work cells used in instruction, instructional television fixed service, and computer teleconferencing. (The bulk of this report consists of information on each of the 78 electronic technologies in use in the Wisconsin VTAE system. For each of the technologies, the predominant features are listed: benefits; barriers; population served; cost for installation, equipment, personnel and operation; and advice.) (KC)

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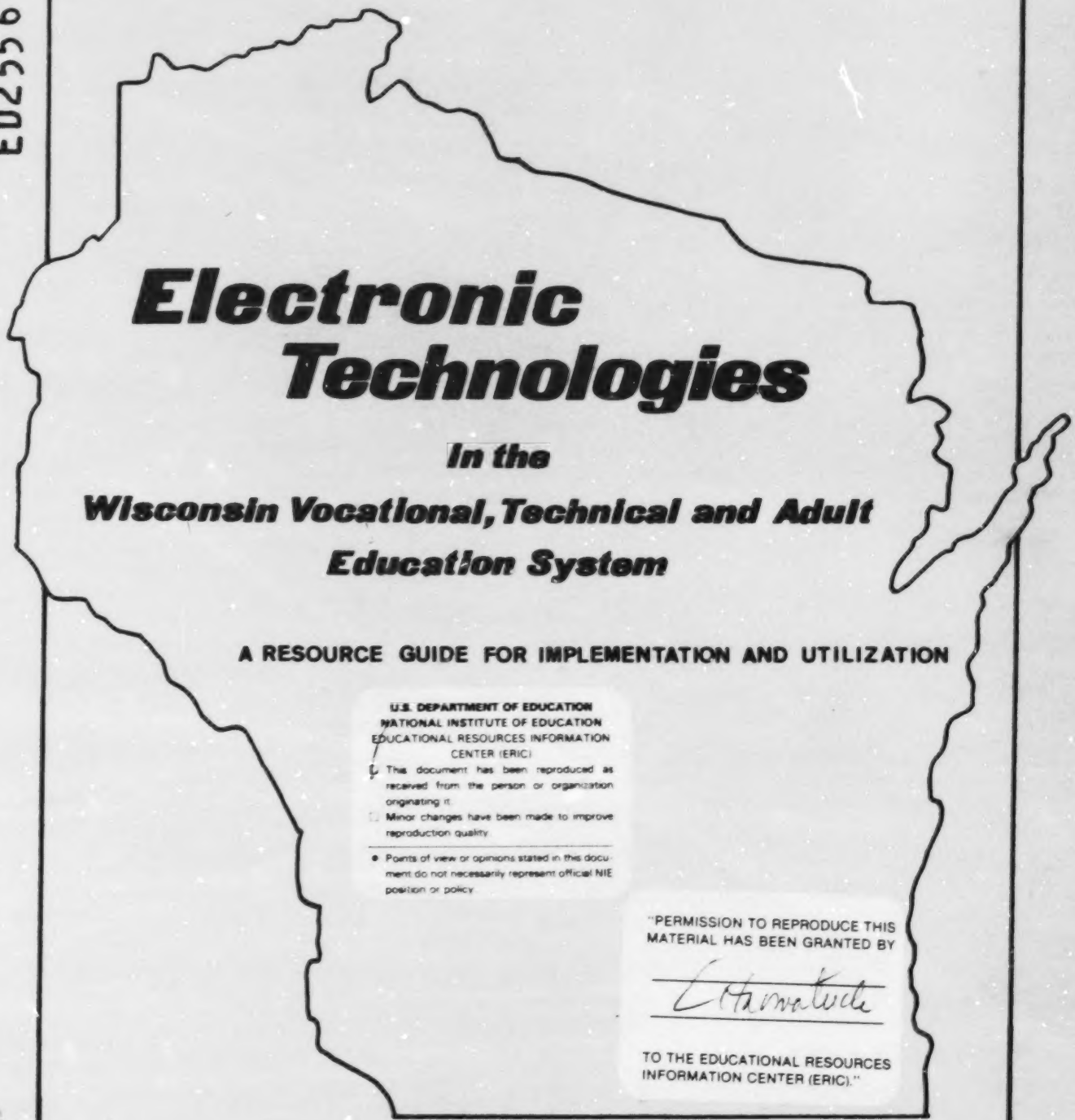

Electronic Technologies

In the Wisconsin Vocational, Technical and Adult Education System

A RESOURCE GUIDE FOR IMPLEMENTATION AND UTILIZATION

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By The Research, Planning and Development Committee

for the Wisconsin Vocational, Technical and Adult Education Administrators' Association

May, 1985

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This report could not have been prepared without the assistance, encouragement and participation of many people.

To this end, special recognition must be given to the subcommittee, chaired by Dr. Douglas Heit of District One Technical Institute, which was responsible for collecting the information and reporting the results. Other members of the committee were Ken Day, Kathleen Paris, Nick Covelli, Ellen Day, Gordon Ellis, Bill Tempte, Rollie Krogstad, Doyle Beyl, Marv Schrader (ex-officio) and Vasant Kumar (ex-officio).

Appreciation is expressed to the dozens of staff members in all districts who provided the information that is reflected in this report.

Lastly, the Research, Planning and Development Committee appreciates the opportunity offered it by the Administrators' Association in being assigned this task.

Vasant Kumar, Ph.D.
Chairperson
Research, Planning and Development Committee

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I. INTRODUCTION

The Wisconsin Vocational, Technical and Adult Education (VTAE) system consists of sixteen VTAE districts which blanket the state of Wisconsin (see map, page 2). The general component of the mission statement of this system as set forth in Wisconsin State Statutes is:

> ". . . to provide a system of vocational, technical and adult education which enables eligible persons to acquire the occupational skills training necessary for full participation in the work force; which stresses job training and retraining; which recognizes the rapidly changing educational needs of residents to keep current with the demands of the work place and through its course offerings and programs facilitates educational options for residents, which fosters economic development; which provides education through associate degree programs and other programs below the baccalaureate level; which functions cooperatively with other educational institutions and other governmental bodies; and which provides services to all members of the public."

To more fully meet the mission of the VTAE system, the Wisconsin Vocational, Technical and Adult Education Administrators' Association, which consists of the local VTAE chief executive officers and other top level administrators, gave one of its standing committees, namely, the Research, Planning and Development Committee, the charge to "examine the impact of technological advances on VTAE's instructional and operational practices." As a first step in achieving the goal, a need existed to determine which electronic technologies were currently in place, being implemented and/or being considered for implementation. Therefore, initial efforts were to prepare this document, which is a collection of the electronic technologies which are impacting the Wisconsin VTAE system and the extent to which each VTAE district is involved in each of the technologies.

This document can be used as a resource guide by any institution or agency considering experimentation or implementation of a technology contained herein. Table 1 lists the technologies and extent to which each VTAE district has implemented each technology. Names, addresses and telephone numbers of the VTAE districts are listed in Appendix A.

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State of Wisconsin

BOARD OF VOCATIONAL, TECHNICAL AND ADULT EDUCATION

July 1, 1981

VIAE

VOCATIONAL, TECHNICAL & ADULT EDUCATION DISTRICTS AND FULL-TIME CAMPUSES

II. PROCEDURE

In an effort to achieve the goal as stated in the Introduction, all 16 of the Wisconsin VTAE districts were surveyed in order to determine:

1. The electronic technologies currently being utilized at each institution.

2. The extent to which each of the technologies of number one above has been implemented at each district. (See rating scale below.)

3. A detailed description of these technologies by those districts having at least an operational knowledge of them.

In regard to number one above, the new and emerging technologies were determined by representatives from various VTAE institutions discussing and listing the appropriate technologies. In addition, any VTAE district not represented at the discussion sessions were contacted through the appropriate research personnel for input.

In regard to number two above, a "Survey to Determine the Extent to Which Districts Have Implemented New Technologies" was constructed and sent to all 16 VTAE districts. This survey contained a listing of new and emerging electronic technologies as determined from number one above. In addition, staff within each VTAE district rated each technology at its own institution according to the following scale:

1 - Not considering this technology at present.
2 - Researching the potential use of this technology.
3 - Experimenting with this technological concept.
4 - Have operationalized the use of this technology.
5 - Have significant experience with this technology.

All 16 districts responded to the survey and the results are listed in section III, "Findings/Results," of this document.

In regard to number three above, a survey was constructed requesting the following information on each technology: features; benefits; barriers; population served; cost for installation, equipment, personnel and operation; and advice. Districts that responded either 4 (have operationalized experience with this technology) or 5 (have significant experience with this technology) to number two above for a specific technology were requested to then complete this survey for that particular technology. Of the 78 technologies surveyed in number two above, responses were received on 51. These responses were synthesized into the collection of resource information in part IV, "Instructional Electronic Technologies in the VTAE System."

III. FINDINGS/RESULTS

Briefly, the results indicate that the sixteen VTAE districts are substantially involved with 78 new and emerging electronic technologies. The degree of involvement varies among districts and includes researching, experimenting, operationalized, and significant experience with the technology applications. The most common technological applications within the system are word processing, computer-assisted design, optical scanning (grading, testing, etc.), internal closed system educational television, and on-line student registration.

Over 40 of the applications were in the areas of instructional delivery and classroom utilization with the remainder being in administrative and student support. Excluding the write-in responses, the least implemented applications were low power educational television, call-up educational programming, work cells used in instruction, instructional television fixed service (ITFS), and computer conferencing.

Table 1 indicates the extent to which Wisconsin VTAE districts have implemented each of the respective electronic technologies. Ratings reflect individual district assessment as each district rated only itself.

Table [1]

Extent* to which VTAE Districts have Implemented Electronic Technologies

Technology	Status of Technology															
	Mdsn	Blkhk	Fox V	Gtwy	Lkshr	Mid-St	Milw	Mor Pk	N Cen	NE Wis	SW Wis	One	Wauk	W Wis	Indnhd	Nic
A. Instructional Delivery																
Computer Based Instruction		2	5	3	3	4	5	4	1	4	4	4	5	4	4	3
Computer Conferencing		1	2	2	3	2	2	3	1	3	2	1	2	1	3	2
Educational Telephone Networking		1	5	4	5	2	4	5	1	1&5	4	4	5	5	5	2
Educational Television																
Cable	1&2	4	5	4	5	3	2	5	2	5	3	5	4	5	3	3
General Broadcast	1	1	4	1	1	3	5	1	1	5	1	5	2	4	2	3
Instructional TV Fixed Service	1	1	3	2	4	2	2	2	2	2	1	2		1	2	2
Internal Closed System/Classroom	2	4	1	5	5	2	5	5	5	5	4	5	2	5	4	4
Low Power	1	1	1	2	4	2	1	1	1	2	1	2	1	1	2	2
Point to Point Microwave	1	1	2	1	5	2	5	5	1	1&2	2	2	2	3	2	2
Interactive Computer	2	1	2&5	2	5	2	4	4	1	2	2	3&4	5	2	2	2
Interactive Computer-TV	1	1	2	2	2	2	3	3	1	2	2	3&4	2	2	2	2
Interactive Televideo	1	1	2	2	4	2	3	2	1	1	1	3	5	4	2	2
On-Site in Industries & On Campus										5						
Radio	1	1	5	1	2	5	2	1	2	3	1	1	1	2	3	
Satellite Conferencing	2&3	1	5	3	5	3	4	5	2	5	4	5	4	3	4	4

*The extent to which districts, as rated by themselves, have implemented each of the listed new technologies. Rating scale is as follows:

1 - Not considering this technology at present.
2 - Researching the potential use of this technology.
3 - Experimenting with this technological concept.
4 - Have operationalized the use of this technology.
5 - Have significant experience with this technology.

Technology	Status of Technology															
	Mdsn	Blkhk	Fox V	Gtwy	Lkshr	Mid-St	Milw	Mor Pk	N Cen	NE Wis	SW Wis	One	Wauk	W Wis	Indnhd	Nic
B. Instructional Applications																
Audio-Tutorial													5			
Automated Materials Handling								3								
CAI for Drill/Practice													5			
Call-Up Educational Programming	1	1	1	2	1	2	1	2	1	1	1	1	1	1	2	2
CNC													5			
Computer Aided Inspection and Reporting								3								
Computerized Data Base Searching	5															
Computers Integrated into Curriculum																
Computer Assisted Design	3&4	4	5	4	5	4	5	4	4	5	5	4	5	4	4	4
Computer Assisted Manufacturing	3&4	2	5	3	4	3	5	4	2	5	4	3	3	2	3	4
Programmable Controls								4								
Robotics													5			
Computer Interactive Readability Analysis	5															
Curriculum Sharing; i.e., Vocational Education Curriculum Materials	2	2	5	4	2	3	4	5	1	5	4	2	5	1	4	2
Electronic Equipment for Handicapped Instructional Assistance; i.e., Talking Computers, Reading Machines, etc.	2	2	4	4	1	2	4	5	5	5	4	2	5	4	4	2
Finance and Credit										3						
Instructional Laboratories																
Computer Data Acquisition-Engine Testing								5								
Computer Managed Instruction	2	2	5	3	1	3	5	4	1	3	3	3	5	3	4	2
Computer Numerical Control								5								
Computerized Accounting	3	3	4	3	2	4	5	4	2	5	4	5	5	2	5	2
Computerized Communication	2	3	4	2	2	3	5	1	1	5	1	2	1	1	4	2
Microcomputer Networks	3	3	4	3	4	4	5	4	4	4	4	2	5	4	5	2
Testing & Record Maintenance										4						
Learning Place Lab													5			
Optical Scanner Applications in Grading, Testing, etc.	3	4	5	5	3	2	5	5	3	5	3	5	5	4	5	2
Programs with Computers Integrated Into Curriculum													5			
Robotics													5			
Work Cells Used in Instruction	1	1	1	3	2	4	1		2		1			1	2	1

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Technology	Status of Technology																
	Mdsn	Blkhk	Fox V	Gtwy	Lkshr	Mid-St	MilW	Mor Pk	N Cen	NE Wis	SW Wis	One	Wauk	W Wis	Indnhd	Nic
C. Support Applications																
Administrative																
Automated Office																
Computerized Facility Sharing	2	2	5	1	1	2	4	1	1	3	1	4	5	1		2
Electronic Calendaring	1	1	5	1	2	4	1	3	4	4	1	2	1	1	4	2
Electronic Mail	2&4	3	5	2	2	3	5	5	4	5	4	4	1&5	1	3	2
Computerized																
Admissions													3			
Business & Industry Contact Information	2	2	5	4	3		4	3	3	5	3	4	5	3	4	2
Computer-Based Photo-Typesetting								5								
Electronic Business Operations; i.e., Electronic Deposits	1	1	5	1	5	4	1	5	2	2	1	4	5	2	1	2
Facility Energy Management Systems	2&3	1	5	1	2	2	5	5	5	4	2	5	5	2	4	2
Financial Aids													3			
Graphics and Spread Sheets													5			
High Speed Duplicating and Offset								5								
Multi-campus Computer Data Transmission								5								
Word Processing, Centralized/ Decentralized	4	4	5	2	5	4	5	5	5	5	5	4	5	4	5	3
Data Base Search with Microcomputer*																
Data Reports						4										
Degree Requirement Computer Check								3								
Electronic Mail*																
Electronic Newsletter*																
Fee Assessment								3								
Finance						4										
On-Line Access to Employers Information Who Have Hired Graduates										3						
On-Line Student Registration	2	4	5	4	4	5	3	5	5	3	2	4	5	2	5	3
Personnel Data						4										
Placement Office-On-Line Mini-Resume Service & On-Line Credential File System										3						
Scanners & Optical Reader Applications in Office Operations	1	2	1	2	3	2	5	5	2	4	3	3	5	1	4	2

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Technology	Status of Technology																
	Mdsn	Blkhk	Fox V	Gtwy	Lkshr	Mid-St	Milw	Mor Pk	N Cen	NE Wis	SW Wis	One	Wauk	W Wis	Indnhd	Nic
C. Support Applications																
Administrative (Continued)																
Student Placement: On-Line Placement System										3						
Student Progress Tracking	2	3	5	2	2	3	4	5	3	4	2	2	5	2	5	2
Telephone Registration	1	2	1	2	4	3	1	5	5	5	2	4	5	4	4	4
Telephone System - Dimension/ Horizon/Mitel								5								
Vocational Telephone Network (VTN)								5								
Students																
Computerized Learning Styles Mapping	1	1	5	2	1	2	4	2	1	1	2	1	2	1	3	2
Computerized Career Exploration and Decision Making; i.e., Discover & MESA	1	3	5	4	4	5	1	4	4	4&5	2	4	4	4	5	4
Computerized Student Assessment	2	3	5	2	4	3	4	4	4	3	4	3	5	2	5	3
Other																
Computerized Library Holding List										4						
Provide Union List for 25 Health/ Science Libraries										5						
Microfiche/ERIC Searches*																

*Submitted by Wisconsin VTAE Board staff.

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IV. INSTRUCTIONAL ELECTRONIC TECHNOLOGIES IN THE VTAE SYSTEM

For each of the electronic technologies in the Wisconsin VTAE system, the predominant features; benefits; barriers; population served; cost for installation, equipment, personnel and operation; and advice are listed. This information was synthesized from survey responses received from the local VTAE institutes. If more in-depth information is desired, contact those VTAE districts who have operationalized the technology or have significant experience with it (see part III).

A. DELIVERY

COMPUTER-BASED INSTRUCTION

FEATURES:	Computer-managed/assisted instruction to include simulation, drills, tests, computations, etc.
BENEFITS:	Alternate vehicle of instruction resulting in greater productivity and potential learning. In-house developed materials are tailored to meet the needs of courses/students.
BARRIERS:	The usual user resistance to new technology. Availability of software for VTAE curriculums. Continual upgrading to keep current, both in equipment and personnel.
POPULATION SERVED:	Varies per four reporting districts from 500 to 2,200 students.

COST RANGE	-----Varies greatly per district-----	
INSTALLATION:	Low-$2,500	High-$60,000
EQUIPMENT:	Low-$30,000	High-$250,000
PERSONNEL:	Low-0	High-$250,000
OPERATION:	Low-$4,000	High-$30,000

ADVICE: Investigate by attending seminars, talking with those with experience and visiting existing labs. Consider networking to reduce software costs and an authoring system allowing for feedback to the student. Once up and running, add areas slowly since staff needs time to gain expertise in assisting with various software packages.

EDUCATIONAL TELEPHONE NETWORKING

FEATURES: Rapid two-way communication between multiple locations for a low cost.

BENEFITS: Rapid communication and can reach anyone, anywhere. Low cost. Ease of implementation.

BARRIERS: No personal contact and lack of visual stimulation - voice contact only. Teacher preparation. Bad connections - poor quality.

POPULATION SERVED: Approximately 50 to 425 students.

COST RANGE

INSTALLATION:	Very low, $100, cost of installing the phone lines
EQUIPMENT:	$600 to $3,500
PERSONNEL:	Regular salary of coordinator and instructor - $3,000
OPERATION:	Varied from $50 a month to depending on number of courses run

ADVICE: Conduct a needs assessment as to types of courses available. Prepare the teacher well in how to use the system and methods of teaching and keep the instructors involved in decision of courses selected. Experienced district work with an inexperienced district to share costs and give an opportunity to begin pilot project.

EDUCATIONAL TELEVISION - CABLE

FEATURES: Cable TV allows the distribution of full video, one-way signal from an origination point to multiple locations wired for cable reception. It can be programmed with live programming directly from a video camera or pretaped programming from video playback equipment.

BENEFITS: This provides an alternative course delivery mode for persons wishing or needing to learn away from the structured classroom. Programming can be offered numerous times during the 24-hour day, 7-day week.

BARRIERS: Effort is required to work with cable companies and municipalities to obtain access to the channel(s). Programming reception is limited to cable television subscribers. Authorization to broadcast commercially prepared AV materials/programs is sometimes difficult, if not impossible, to obtain. Impressions that TV courses are less effective than live presentations must be overcome.

POPULATION SERVED: Any cable subscriber (i.e., individuals, firms, government agencies, etc.) can be served.

COST RANGE

INSTALLATION:	$3,500 to $10,000+
EQUIPMENT:	$ 600 to $20,000
PERSONNEL:	$2,000 to $ 5,000 for scheduler and operator
OPERATION:	Low ($1,000 for maintenance)

ADVICE: Work with municipalities and cable companies early to obtain access to the channel(s). The VTAE telecommunications coordinator should be contacted for information and support. Staff indoctrination regarding differences in this mode from the live presentation and how to make effective TV presentations is important. Staff for the coordination of programming, instruction, materials, registration, etc., is important.

EDUCATIONAL TELEVISION - GENERAL BROADCAST

FEATURES: This mode uses one-way public broadcast channels. This mode enables programming to be accessed by those having a television set with UHF/VHF capabilities.

BENEFITS: General broadcast programming reaches students not able to get to the campus(es) because of handicap, distance, schedule, etc. There is a relatively low cost involved. Instruction/programming can be delivered to large numbers of students in many locations simultaneously.

BARRIERS: Lack of live interaction with the on-campus facilitator is a concern. Limited time slots are available. The format of videotape needed is larger than the format usually used in VTAE instruction.

POPULATION SERVED: This delivery mode can reach almost the entire population.

COST RANGE

- **INSTALLATION:** None to $100,000 (rented versus owned)
- **EQUIPMENT:** None to $1,800,000 (rented versus owned)
- **PERSONNEL:** $2,000 to $500,000 (highly qualified/FCC licensed - rented versus owned)
- **OPERATION:** $5,000 to $1.8 million (rented versus owned)

ADVICE: Check with others using it for alternative ways it can be utilized. Share state VTAE offerings. Work with adjacent districts as the broadcast crosses district boundaries.

EDUCATIONAL TELEVISION
INSTRUCTIONAL TELEVISION FIXED SERVICE (ITFS)

FEATURES: This is an omnidirectional, line-of-sight microwave transmission. The range is approximately 15 miles.

BENEFITS: It can be used to transmit to only those having a dish. It can apply to restricted transmissions. The license is easy to obtain and is for school use only. This eliminates bicycling of tapes to cable company head end. Additional channels can be added in groups of four.

BARRIERS: The line-of-sight characteristic limits the signal reception access to those sites having proper altitude requirements or a high tower with a receiving dish.

POPULATION SERVED: Primarily schools, firms, and cable company head end receive the signal.

COST RANGE

INSTALLATION:	$ 8,000 for engineering and labor
EQUIPMENT:	$75,000 for the tower and transmitter ($1,200 to $1,500 per receiver)
PERSONNEL:	Part-time staff for programming and operation
OPERATION:	$ 2,000 per year

ADVICE: Feasible for relatively flat terrain only. Don't consider the technology for hilly terrain areas.

EDUCATIONAL TELEVISION
INTERNAL CLOSED SYSTEM/CLASSROOM

FEATURES: This delivery mode enables the distribution of programming to a number of on-campus locations simultaneously from one distribution center thereby saving on numbers of playback equipment, tape cassettes, etc. Programming may be available upon request of the individual instructor or student.

BENEFITS: The closed-circuit equipment reduces the cost of playback equipment and tapes. Upon request, programming makes use of the video most effective in instruction or for use in individualized, self-paced instruction. Storage and distribution of AV programs are facilitated.

BARRIERS: Communication between the control room and the individual is difficult for controlling when the tape is to be played. Some precision of control is removed from the instructor because of distance from the control.

POPULATION SERVED: This is used with on-campus students.

COST RANGE

INSTALLATION:	Moderate (high of $10,000 for 12 channels/$500 per unit)
EQUIPMENT:	$2,000 (high of $40,000 for 12 channels)
PERSONNEL:	One person for controlling the tape playing
OPERATION:	Low

ADVICE: Adequate communication between the control room and the instructor/student is a must. The cost of the control room person versus additional playback equipment and additional AV copies should be balanced with the loss of instructor/student precise control starting/stopping/review points on the AV.

EDUCATIONAL TELEVISION - LOW POWER

FEATURES: This is a type of open-broadcast television (UHF/VHF). The coverage is in an approximately eight-mile radius from the transmitter.

BENEFITS: The signal can be received by anyone within the coverage area having a television set, especially those not having cable TV access (i.e., people in rural areas and noncable subscribers). Staff are not required to have an FCC first-class operator's license.

BARRIERS: There is a limited covered area. It is difficult to obtain the FCC broadcast license, particularly if you are located within a metropolitan TV broadcast area. It is more subject to atmospheric and electrical signal interference than full-power broadcast television transmissions.

POPULATION SERVED: Anyone having a television set within the broadcast area can receive the programming.

COST RANGE

INSTALLATION:	$1,000
EQUIPMENT:	$25,000 for the tower & $10,000 for the transmission equipment
PERSONNEL:	Part-time staff for scheduling programs and basic maintenance
OPERATION:	$1,000 per year

ADVICE: It is limited in value because of the small coverage area except in a metropolitan area or to supplement other types of transmission.

EDUCATIONAL TELEVISION
POINT TO POINT MICROWAVE

FEATURES: Allows video signal to be transmitted over long distance to tie together video-based operations.

BENEFITS: Allows to reach different communities from one location with one set of tapes through cable TV once signal is received.

BARRIERS: Point to point only. Red tape through FCC.

POPULATION SERVED: Not available

COST RANGE
- INSTALLATION: Approximately $1,000-$2,000 per mile-dependent upon many
- EQUIPMENT: variables.
- PERSONNEL: Minimal once installed
- OPERATION: Less than "ITFS"

ADVICE: Preliminary engineering of microwave path and realistic cost estimates important. Look at all the alternatives. Best used for distances less than 25 miles apart.

INTERACTIVE TELEVIDEO

FEATURES: Provides two-way interactive video and audio communications between main campus and eight high schools in northern part of district.

BENEFITS: Allows for students to be enrolled in lecture, discussion and lab courses while being dispersed throughout a wide geographic area.

BARRIERS: High initial cost of equipment.

POPULATION SERVED: Both high school and adult age persons through post secondary and adult level courses.

COST RANGE
- INSTALLATION: $200,000
- EQUIPMENT: Included in installation
- PERSONNEL: Same as regular course offerings
- OPERATION: Unknown

ON-SITE IN INDUSTRIES AND ON CAMPUS

FEATURES: Videotaped courses on-site to be used at student's discretion.

BENEFITS: Industry can use them on their time schedules - can start at any time - works well for employees who rotate shifts - can be used independent from equipment - low cost - student controlled.

BARRIERS: Opinion that you must pay a lot to get something useful.

POPULATION SERVED: Businesses throughout the district and students in area centers.

COST RANGE
- INSTALLATION: $500 for player and monitor, if needed
- EQUIPMENT: $160 per tape
- PERSONNEL: $30 per set of eight courses
- OPERATION: None

ADVICE: Least expensive way to provide courses throughout the district where industry will pay student's time on-site. Buy one setup per industry site.

RADIO

FEATURES: Sessions are recorded with opportunity for instructor to do live session if he/she chooses. Wide audience. Cost-effective instruction.

BENEFITS: Wide audience. Cost. Familiarity and portability of the medium (radio).

BARRIERS: One-way communication. Student needs to be self-disciplined.

POPULATION SERVED: 150-260 a year

COST RANGE
- INSTALLATION: Included in equipment cost
- EQUIPMENT: $27,000
- PERSONNEL: $800/year
- OPERATION: $250/year

ADVICE: Research market potential and determine potential audience. Need good cooperation and communication between technical and instructional components of project. Provide strong promotional effort and follow-up for determining results.

SATELLITE CONFERENCING

FEATURES: Districts involved have receiving stations capable of receiving signals of approximately 28 satellites which serve the United States and Canada. The systems can receive programming from satellites located approximately 300 miles high over the equator.

BENEFITS: Provides access to wide range of resources and instructional materials. Through satellite conferencing the training is possible without incurring high travel costs and travel time.

BARRIERS: Satellite equipment cost, availability and up-line cost. Identifying programming requires continual detective work since there is no complete listing of programming. However, members of the Wisconsin VTAE Media Consortium are currently developing a computer bulletin board system through which to share satellite programming information.

POPULATION SERVED: 125 to 175

COST RANGE

- **INSTALLATION:** $350 to $500
- **EQUIPMENT:** $2,922 to $4,059
- **PERSONNEL:** A media technician is needed for the operation of the system.
- **OPERATION:** Minimal

ADVICE: Check wide availability of equipment options. Become active in Wisconsin VTAE Media Consortium. Develop a target audience plan.

B. APPLICATIONS

COMPUTERIZED DATA BASE SEARCHING

FEATURES: Computer acess to hundreds of data files in business, education, medicine, agriculture, science, literature, technology, etc.

BENEFITS: Ability to rapidly acquire bibliographic citations relating to specific informational needs, and ability to produce informational reports.

BARRIERS: Requires education and practice in the techniques of data base searching. (Minimum of a two-day introductory seminar.)

POPULATION SERVED: Faculty, students, anyone needing information.

COST RANGE

INSTALLATION:	None
EQUIPMENT:	CRT or printing terminal and a modem ($100 and up)
PERSONNEL:	Training seminar, cost $150
OPERATION:	$20-$200 per hour depending on data base

ADVICE: Contact Dialog Info Services, 3460 Hillview Avenue, Palo Alta, CA 94304; or BRS, 1200 Rt. 7, Latham, NY 12110.

COMPUTERS INTEGRATED INTO CURRICULUM
COMPUTER ASSISTED DESIGN

FEATURES: Automated drafting and design procedures integrated into mechanical, electrical, architectural, etc., design-related occupations.

BENEFITS: Cost savings - ability to perform skills and tasks traditionally accomplished by a draftsperson. Improves design and accuracy. Handicapped persons can use and produce.

BARRIERS: User resistance to new technology. Costs for development of instructors, curriculum and equipment and maintenance expense. Difficulty in keeping up with changes/technology innovations.

POPULATION SERVED: Of seven reporting districts, the low was 40 (9 months operation) and the high was 500/year. Some districts failed to note full-time/part-time breakdowns.

COST RANGE ---Varies per seven reporting districts---

INSTALLATION: In most cases included in equipment acquisition.

EQUIPMENT: Unable to compare without breakdown on system sizes; i.e.,

PERSONNEL: work stations.

OPERATION: Annual costs range from a low of $1,000 to a high of $60,000 depending on system size/work stations, etc.

ADVICE: Investigate by visiting schools with existing systems and involve industry, as well as vendors, in planning and training, visiting sites and seeking funding. Seek vendors that will offer educational contributions or assistance but do not compromise system quality and request on-site demonstrations. Establish periodic communications with operational uses (non-educational, non-sales) and invite them to seminars and clinics. Seek system upgrades, funding and constant staff development.

COMPUTERS INTEGRATED INTO CURRICULUM
COMPUTER ASSISTED MANUFACTURING

FEATURES: Elements of manufacturing a product from design through manufacturing to billing are controlled by the computer.

BENEFITS: State-of-the-art manufacturing technology is provided, which is the key to automation of improved productivity and quality of the manufacturing process. There is cost reduction, therefore, profit improvement as well as close industrial participation.

BARRIERS: Diversity of application in different types of industry and the equipment and software are costly. Instructor training and course development involve a lot of time.

POPULATION SERVED: All manufacturing industry, designers and engineering firms. Students enrolled in courses that would permit them to have access to the system. Also, employed technicians who are seeking to upgrade their skills.

COST RANGE

INSTALLATION:	From $25,000 to $134,000.
EQUIPMENT:	From $300,000 to $2 million.
PERSONNEL:	From $40,000 to $250,000.
OPERATION:	From $77,700 to $100,000.

ADVICE: Look toward industrial emulators and simulators for planning, training, and funding of the project.

COMPUTERS INTEGRATED INTO CURRICULUM
PROGRAMMABLE CONTROLS

FEATURES: Instruction units in programmable controls.

BENEFITS: Increasing use of programmable controls in manufacturing.

POPULATION SERVED: Course for full-time electronic and electromechanical students, ACE course and in-plant training.

COST RANGE

INSTALLATION:	None
EQUIPMENT:	$6,000-$8,000/system - 4-6 different systems required for course instruction
PERSONNEL:	Instructor training costs - $4,000
OPERATION:	Minimal

COMPUTERS INTEGRATED INTO CURRICULUM
ROBOTICS

FEATURES:	Uses industrial-type robot to teach robotics principles, applications and programming.
BENEFITS:	Improves productivity and quality in material handling and manufacturing.
BARRIERS:	Costs for equipment and staff development and training.
POPULATION SERVED:	About 75 manufacturing students and employed technicians per year.

COST RANGE

INSTALLATION:	Included in equipment acquisition.
EQUIPMENT:	About $75,000 per industrial-type robot.
PERSONNEL:	$6,000 for instructor training.
OPERATION:	About $3,000 per month per robot.

ADVICE: Select most widely used equipment/vendor.

CURRICULUM SHARING; I.E., VOCATIONAL EDUCATION CURRICULUM MATERIALS

FEATURES: Curriculum is in a computer-based format for all systems. Each system may be unique in its own respect though, from mainframe terminals equipped with the Automated Office System (AOS) to word processing equipped to handle telephone requests for material. Most systems have access on any mainframe in the district to the information about particular courses.

BENEFITS: Curriculum becomes more consistent and organized; therefore, results are more uniform. There is an increase of communication and sharing of materials.

BARRIERS: It takes time to implement change within a large organization, especially if the availability of resources is a factor. Also, making sure that people know the data base exists and getting input for all courses.

POPULATION SERVED: Instructors, program supervisors, advisory committees, counselors, students, and schools with similar program interests.

COST RANGE

INSTALLATION:
EQUIPMENT:
PERSONNEL:
OPERATION:

Lack of information in this area, so the cost range can only be determined by individual systems based upon the equipment and software that already exists.

ADVICE: An operation that is well worth implementing! Sharing of ideas has proved essential in this area.

ELECTRONIC EQUIPMENT FOR HANDICAPPED INSTRUCTIONAL ASSISTANCE; I.E., TALKING COMPUTERS, READING MACHINES, ETC.

FEATURES: The two HIP/VIP programs in the state reported the following instructional aids: low vision, closed circuit TVs and monitors; talking computer terminals, calculators and typewriters; reading machines; recorders; and braillers.

BENEFITS: Equipment saves manpower and transcription costs. It enables handicapped/visually and hearing impaired students to be competitive in school and enter employment.

BARRIERS: Costs to update

POPULATION SERVED: 100/year at North Central Technical Institute; 150 per year at Milwaukee Area Technical College.

COST RANGE
- INSTALLATION: Included in equipment acquisition
- EQUIPMENT: NCTI-$100,000; MATC-$50,000
- PERSONNEL: NCTI-None; MATC-$25,000
- OPERATION: Between $2,000 and $3,000 annually

ADVICE: To avoid need and/or duplication of effort, determine if numbers of students would justify costs. Read, see, use and evaluate equipment in a competitive setting before making decisions. Become active with support groups while using equipment.

INSTRUCTIONAL LABORATORIES - COMPUTER DATA ACQUISITION-ENGINE TESTING

FEATURES: Facilitates data acquisition for engine testing through use of computers.

BENEFITS: It is an example of the latest technology used by engine manufacturers in Wisconsin.

BARRIERS: Cost and the need for staff expertise with computers.

POPULATION SERVED: About 40 students per year in the area of engine manufacturing, troubleshooting, servicing, repair and maintenance.

COST RANGE
- INSTALLATION: $10,000 (approximate)
- EQUIPMENT: $20,000 per system
- PERSONNEL: $8,000 for instructor training
- OPERATION: About $3,000 per year

ADVICE: One installation in the state is adequate in accordance with the number of technicians required for industry.

INSTRUCTIONAL LABORATORIES - COMPUTER MANAGED INSTRUCTION

FEATURES: Computers used to monitor, as well as present instructional materials; utilization of available instructional and remedial resources on a prescription basis.

BENEFITS: Individualized materials; students proceed at own speed; instructor doesn't worry about forgetting some available material.

BARRIERS: Tendency to feel controlled by machine - general fear of computers - retraining of faculty.

POPULATION SERVED: Currently, students in reading workshops (approximately 120).

COST RANGE

INSTALLATION:	$ 4,000 (four campuses)
EQUIPMENT:	$ 50,000 (four campuses)
PERSONNEL:	$120,000 (four full-time faculty)
OPERATION:	$ 6,000 (software of $1,000 and supplies of $500 for each of the four campuses)

INSTRUCTIONAL LABORATORIES - COMPUTER NUMERICAL CONTROL

FEATURES: Instruction in computer-controlled machining.

BENEFITS: State-of-art technology for computer-controlled machining employed in most manufacturing companies.

BARRIERS: Cost of equipment and instruction expertise.

POPULATION SERVED: Full-time industrial engineering, machine tooling technics students and employed technicians seeking skill update.

COST RANGE

INSTALLATION:	Varies by equipment and systems
EQUIPMENT:	Present investment for NC equipment and support systems- $250,000
PERSONNEL:	Instructor training - $8,000
OPERATION:	Approximately $650/month

ADVICE: Extensive lead time required for equipment acquisition, instructor training and curriculum development. Very difficult to start without existing base of resources and expertise.

INSTRUCTIONAL LABORATORIES - COMPUTERIZED ACCOUNTING

FEATURES: Training that makes use of commercially prepared application software. The training provides an introduction to hardware, software, and programming of microcomputers for faculty, staff and students.

BENEFITS: An informal atmosphere is created so "students" have the opportunity to learn using the technology that is used by the business community.

BARRIERS: Two few facilities are available due to the cost of updating the software and maintenance of the equipment. Once again, instructor training and course development involves a lot of time.

POPULATION SERVED: 150-400 students per semester. Most labs also serve the faculty and staff.

COST RANGE

INSTALLATION:	From $300 to $10,000.
EQUIPMENT:	From $20,000 to $120,000 (approximately $2,000 per station).
PERSONNEL:	From $6,000 to $90,000.
OPERATION:	From $5,000 to $50,000.

ADVICE: Equipment will never be used without a well conceived plan, but be aware that implementation is never really complete because the field changes and software and hardware must be updated. Encourage "students" to teach themselves in learning to read screens, follow prompts, and be able to use original documentation rather than merely to push buttons, so that the student can transfer knowledge to new application packages.

INSTRUCTIONAL LABORATORIES - COMPUTERIZED COMMUNICATION

FEATURES: Are essential, individualized, and less expensive.

BENEFITS: Jobs readily available. Excites students' interest and they can do independent study. Composing and rewriting is less tedious.

BARRIERS: Budget. Teacher CAI literacy needs to be expanded. Available space - each instructional department could use its own lab.

POPULATION SERVED: 50-100

COST RANGE
- INSTALLATION:
- EQUIPMENT:
- PERSONNEL: $1,250 per system used during class-contact hours
- OPERATION:

INSTRUCTIONAL LABORATORIES - MICROCOMPUTER NETWORKS

FEATURES: A number of microcomputers in several locations are connected to hard disk drives so that a software program located in one area can be used by a number of students simultaneously.

BENEFITS: Equipment and personnel are utilized to a greater extent than when having scheduled lab sections. Common storage of programs on networked hard disks alleviates the need for multiple copies of programs (reduces costs). Disk-based files increase the speed of access.

BARRIERS: Higher initial cost is one barrier. Scheduling orientation and initial instructional sessions in the lab are difficult. Other students may be using some of the terminals or all students may not have the same periods available.

POPULATION SERVED: All on-campus students enrolled in data processing/computer literacy microcomputer lab courses.

COST RANGE
- INSTALLATION: Unknown
- EQUIPMENT: $3,500-$60,000 (depends on size, number, & type of microcomputers)
- PERSONNEL: One person (assistant level) whenever the lab is in operation
- OPERATION: Unknown

ADVICE: It is important that the software being considered can be networked. Long-term storage requirements should be reviewed. Optional larger capacity drives are not much more expensive than regular-size ones. Backup disks should be available. Plan the wiring carefully to reduce the student dislodging of connectors.

INSTRUCTIONAL LABORATORIES - TESTING AND RECORD MAINTENANCE

FEATURES: The system is individualized, yet motivating for students. With a few modifications, the system can be operated by the handicapped.

BENEFITS: Drill practices and reinforcement concepts are applied to remedial work.

BARRIERS: A limited budget is enforced, so there are not enough computers to serve the population. There is also a limited amount of software available to this program.

POPULATION SERVED: 380 students per semester. Developmental students enrolled in reading, grammar, math and study skills, as well as the disabled.

COST RANGE
- INSTALLATION: Unavailable
- EQUIPMENT: Unavailable
- PERSONNEL: Unavailable
- OPERATION: Unavailable

ADVICE: Preview all software material before it is purchased. Be sure to instruct students on the care and handling of the disks and equipment. Always have backup material.

OPTICAL SCANNER APPLICATIONS IN GRADING, TESTING, ETC.

FEATURES: Scores teacher-prepared tests, standardized tests, provides item analysis and class averages, counts ballots and tabulates survey responses. Some systems can be on-line to mainframe computer.

BENEFITS: Speed of tabulation of information; statistical cross tabulation reports would not be feasible with manual methods.

BARRIERS: No machine intelligence, or no error detection on the "Scan-tron 2700."

POPULATION SERVED: Between 75-300 per district involved.

COST RANGE
- INSTALLATION: $0-$500
- EQUIPMENT: $800-$2,950 (1 district - $30,000)
- PERSONNEL: $0-$2,950 (District with cost in programming and technical)
- OPERATION: Test scoring answer forms range from $16 to $78 per thousand. (One district $5,000 cost for operation)

ADVICE: Check machine error detection capabilities, feeding mechanism and how it handles multiple marks per field.

C. SUPPORT APPLICATIONS

ADMINISTRATIVE

AUTOMATED OFFICE - COMPUTERIZED FACILITY SHARING

FEATURES: There is multiple access for the purpose of open room searches which reduces conflict in checking.

BENEFITS: This system reduces clerical work, errors, and time in searching for available rooms.

BARRIERS: This system must be incorporated with a class scheduling system.

POPULATION SERVED: A total of 49 was recorded by this single response which included deans, associate deans, and department chairpersons.

COST RANGE

INSTALLATION:	Part of a larger system - the cost is unknown.
EQUIPMENT:	About 1/10 of a terminal.
PERSONNEL:	About 1/10 of clerk time.
OPERATION:	Unknown.

ADVICE: While this can reduce the clerical time involved, we have not found a method to completely eliminate hand-updated room schedules. Central control seems to be the most effective method of scheduling rooms.

AUTOMATED OFFICE - ELECTRONIC CALENDARING

FEATURES: On-line calendars to schedule conflicts, maintain appointments, personal reminders, schedule conference room and group meetings.

BENEFITS: More efficient tool for scheduling.

BARRIERS: User resistance to new technology and change in routine. All management staff must use the system to be effective.

POPULATION SERVED: Approximately 120 to 150 persons

COST RANGE ----Varies per three reporting districts-----
- INSTALLATION: From a low of $1,500 to $15,000 (for whole package)
- EQUIPMENT: None
- PERSONNEL: None
- OPERATION: None

ADVICE: In the research phase, determine total equipment needs to serve the intended base and examine the requirements and implementation time required. Be prepared for resistance to change and fear of use.

AUTOMATED OFFICE - ELECTRONIC MAIL

FEATURES: Computerized transmission and storage of documents which can also be printed. Capabilities include send, receive, forward, answer, batch, file, auto answer, group send, etc.

BENEFITS: Speeds and improves communication. Reduces tasks by automated process.

BARRIERS: User resistance to new technology and change in operating procedures. Time required to become familiar with software.

POPULATION SERVED: Varies per five reporting districts from a low of 12 to a high of 1,500.

COST RANGE
- INSTALLATION: Varies from 0 to a high of $500
- EQUIPMENT: Varies from 0 to an annual lease cost of $500
- PERSONNEL: None
- OPERATION: Varies from $300/year to $1,200 per year

ADVICE: Investigate most current technology. Get electronic calendar with system so it has greater utility. Have adequate staff and equipment to test applications. Develop a formal training package for easy referral and encourage use and new applications to expand potentials.

COMPUTERIZED

BUSINESS AND INDUSTRY CONTACT INFORMATION SYSTEM

FEATURES: This automated management system features compliance screen and various qualitative edits. It provides updated lists of area employers, mailing lists, contact records, and courses and seminars offered, as well as a placement file of graduates employed for each company.

BENEFITS: Allows the VTAE district to have easy access to current data to record and display services provided to employers. It provides a method of communicating business and industry contacts for the purpose of avoiding duplication.

BARRIERS: Getting people to develop a sense of responsibility to use the system and to accurately enter and check data. Programming has been difficult to achieve when changes are necessary, especially with limited screen capacity.

POPULATION SERVED: VTAE District One administrators, coordinators, instructors, supervisors, faculty and cooperating agencies.

COST RANGE

INSTALLATION:	From $1,000 to $30,000.
EQUIPMENT:	Up to $5,000.
PERSONNEL:	Up to $30,000 per year.
OPERATION:	Up to $7,000 per year.

ADVICE: Be sure users understand how and when to use the system. Consulting with other users minimizes mistakes. The system should be designed similar to another user so changes are easier and the system should be operating during a lighter work load time to allow more time for user in-service.

COMPUTER-BASED PHOTO-TYPESETTING

FEATURES: This system allows for direct interfacing of word processing with photo-typesetting equipment utilizing the institution's mainframe computer as a link and storage device.

BENEFITS: Information for printing is inputted only once through a word processing terminal. All other modifications and layout of the material is accomplished through the computer-based system.

BARRIERS: High cost of equipment and lack of understanding of how the system works by most persons in the graphics arts area.

POPULATION SERVED: Postsecondary students in printing and publishing programs and persons employed in district graphic arts industry.

COST RANGE
- INSTALLATION: Low cost
- EQUIPMENT: Very high cost
- PERSONNEL: High cost for training
- OPERATION: Lost cost

ADVICE: Obtain good technical consultation from experts in the field prior to designing of the system.

ELECTRONIC BUSINESS OPERATIONS; I.E., ELECTRONIC DEPOSITS

FEATURES: Net earnings of all employees are deposited directly to each employee's individually selected demand or savings account.

BENEFITS: Eliminates the need to print and produce hard copy paychecks, distribution problems, and lost paychecks. Improves timeliness of payments.

BARRIERS: Psychological impact of employees not receiving a paycheck and unwillingness to cooperate. Earnings statements must still be issued.

POPULATION SERVED: All full- and part-time employees.

COST RANGE
- INSTALLATION: Minimal
- EQUIPMENT: None
- PERSONNEL: Minimal
- OPERATION: $100 per month - bank processing charges

ADVICE: Compare service and processing costs of financial institutes. Allow sufficient lead time to promote the idea and accumulate employee direct deposit forms.

FACILITY ENERGY MANAGEMENT SYSTEMS

FEATURES: Monitors and controls energy consumption through start/stop scheduling, data cycling, demand monitoring and control and data gathering and reporting.

BENEFITS: Reduced energy costs, central scheduling of equipment run times (holidays) and problem reporting.

BARRIERS: Mechanical system which must be in good operating condition. Training required for programming.

COST RANGE
- INSTALLATION:
- EQUIPMENT: Varies per three reporting districts from $55,000-$159,500.
- PERSONNEL:
- OPERATION: Maintenance contracts vary annually from $3,700 to $20,000.

ADVICE: Investigate by attending seminars, visiting existing facilities and talking to those with experience or hiring a consultant if necessary. Do energy audit of facility. Consider the total cost of system, equipment to install, maintenance contract and personnel training--expansion needs are a possibility. Maintain system at peak performance and continue to update system/personnel.

GRAPHICS AND SPREAD SHEETS

FEATURES: Software packages for microcomputers to organize and process data.

BENEFITS: Increased speed and sophistication in compiling data into useful information.

BARRIERS: Need to know how to use the software and have access to a microcomputer.

POPULATION SERVED: Office staff who need to compile and present data.

COST RANGE
- INSTALLATION: Purchase software, $100-$7,000
- EQUIPMENT: Microcomputer, $500-$10,000
- PERSONNEL: None
- OPERATION: None

ADVICE: Visit a local computer store for advice and ideas.

HIGH SPEED DUPLICATING AND OFFSET

FEATURES: Plate maker, offset presses, high speed duplicating units, stitcher/joggers, paper drills, folders. If you are providing a centralized offset and duplicating center, generally you are providing assembly functions such as folding, collating, stapling, labeling, etc.

BENEFITS: Enables an organization to duplicate massive volumes of printed copies. Offset press provides high quality duplicating incorporating photographs, providing color printing.

BARRIERS: Initial investment of equipment. Orientation to staff on how to utilize equipment and implementation of the change.

POPULATION SERVED: All staff. Current productivity is 5 million copies per year on high-speed duplicating equipment and 2.5 million copies per year on offset press.

COST RANGE

- **INSTALLATION:** $2,500 (estimated)
- **EQUIPMENT:** Offset--$12,000 (approx.); high speed duplicating such as Xerox 9400-$100,000+
- **PERSONNEL:** $13,700/year/offset operator (salary only); $11,400/year/high-speed duplicating operator (salary only)
- **OPERATION:** $30,000/year (est.) including all paper stocks and equipment supplies. $2,500 maintenance costs on high-speed copier based on volume indicated above. $2,000/year (est.) maintenance costs on one offset press.

ADVICE: Need qualified person to carefully investigate equipment and implementation processes. Fear of change on the part of staff may occur, requiring staff involvement and orientation.

MULTI-CAMPUS COMPUTER DATA TRANSMISSION

FEATURES:	Telephone lines, circuits, modems, CRT's.
BENEFITS:	Current and fast data access by all staff throughout the district.
BARRIERS:	Orientation of staff throughout the district to what is available through D.P. and how to utilize CRT's, hook-up of various communication equipment in multi-vendor setting with divestiture of AT&T.
POPULATION SERVED:	350+ people
COST RANGE	
INSTALLATION:	Difficult to estimate. Depends upon equipment configuration and companies you're dealing with.
EQUIPMENT:	Approx. $4,000 per modem for 4800 baud transmission, lines vary with distance, circuits cost dependent upon vendor.
PERSONNEL:	D.P. and communications manager's time.
OPERATION:	Depends upon vendor.
ADVICE:	Evaluate modems from various different vendors. Get estimated cost information from communication vendors involved prior to installation. Important--make sure the equipment you are intending to communicate is compatible!

WORD PROCESSING, CENTRALIZED/DECENTRALIZED

FEATURES: The basic features of these systems include WP and CRT keyboard functions, as well as storing, archiving and retrieving of documents. All of the systems are also equipped with letter quality and laser printers, but only a few are equipped with sound shields and limited graphic abilities. A few systems have unique features such as electronic mail filing and scheduling (PROFS) and centralized dictation.

BENEFITS: Materials are centrally maintained for extensive editing capabilities, retrieval, revisions, and incorporation into other documents. Efficiency and productivity have increased for a better quality product, as well as the automated distribution of that product. An excellent tool for time management!

BARRIERS: Implementation of WP results in orienting the entire staff to change and overcome the fear of that change. Work habits are changed for the entire staff because there is lack of understanding of how to use the system for maximum benefit, which results in user resistance. Courses must be developed in order to get everyone adequately trained within a reasonable time period.

POPULATION SERVED: 50 to 150 students per year. Entire administrative and support staff.

COST RANGE

INSTALLATION:	From $200 to $175,000.
EQUIPMENT:	From $15,000 to $175,000 ($3,000 to $12,000 per station).
PERSONNEL:	From $500 to $130,000.
OPERATION:	From $500 to $130,000.

ADVICE: Evaluate centralized versus decentralized or a mixed combination of concepts to determine the best alternative for the entire organization. Once this is determined, gradually phase in the implementation and involve the staff at all levels of researching - this will diminish fears. Plan the system and equipment to ensure compatibility for future expansion and constantly look toward the goals that have been set and what the outcome will be.

DATA BASE SEARCH WITH MICROCOMPUTER

FEATURES: Up-to-date information and knowledge in many data bases throughout the nation are made available through use of microcomputer terminals and telephone networks.

BENEFITS: Provides ready access to current knowledge and research in many rapidly changing fields for better decision-making, planning, instructional innovation, and curriculum development.

BARRIERS: Unfamiliarity or hesitancy on the part of staff to use the service.

POPULATION SERVED: Teachers, coordinators, supervisors, counselors, librarians, media and curriculum specialists.

COST RANGE

- **INSTALLATION:** None - Subscriptions to data brokerage services
- **EQUIPMENT:** $2,500 and up for microcomputer and modem
- **PERSONNEL:** Trained searcher by the hour or on part-time basis
- **OPERATION:** Variable with volume of usage. Host computer time, data base services, phone lines, micro system ($3,000-$10,000 per year)

ADVICE: Ascertain the nature of data bases which are accessible directly and/or through "brokerage" services to meet needs. Work with full text and indexing capabilities of existing publications and services. In-service operating and user staff.

ELECTRONIC MAIL

FEATURES: Provide two-way communication through use of computer terminals and telephone lines. There are currently three types--(1) State - links Wisconsin Board of Vocational, Technical and Adult Education with VTAE districts, (2) ADVOC-NET - links U.S. Education Department with each state, (3) REGSNET - links U.S. Education Department with states regarding legislation information.

BENEFITS: Immediate transfer of hard copy documents from sender to receiver terminal.

BARRIERS: Reluctance of users.

POPULATION SERVED: #1 is used by anyone in the Wisconsin VTAE system.
#2 and #3 are used by policy makers, administrators, planners and others.

COST RANGE

INSTALLATION:	Computer terminal
EQUIPMENT:	Computer terminal
PERSONNEL:	Terminal operator
OPERATION:	Part-time operator

ADVICE: In-service of faculty and administration to promote usage of the technology.

ELECTRONIC NEWSLETTER

FEATURES: This is a newsletter which comes electronically through the use of computer terminals and telephone lines periodically from NCRVE to each state via the curriculum liaison network.

BENEFITS: Disseminates recent research and developments in various technologies applicable to vocational, technical and adult education.

BARRIERS: Lack of familiarity and hesitancy on the part of staff to use the service.

POPULATION SERVED: Faculty, administrators, planners, researchers, and developers

COST RANGE

- **INSTALLATION:** Computer terminal
- **EQUIPMENT:** Computer terminal
- **PERSONNEL:** Part-time operator
- **OPERATION:** A free service provided by NCRVE and the Nation-wide Curriculum Network

ADVICE: Apprise staff of the availability and benefits of the service.

ON-LINE STUDENT REGISTRATION

FEATURES: A comprehensive student information system utilized for on-line registration, calculations, demographic data and linkages to financial aids and other systems.

BENEFITS: Provides most current data efficiently and accurately. Reduces manually generated handling of forms and reports. Is able to analyze and collect the statistical information of entire populations.

BARRIERS: The usual user resistance to new technology. During student registration periods, "down time" requires a backup system.

POPULATION SERVED: Varies per five reporting districts from a low of 4,000 to a high of 30,000.

COST RANGE
INSTALLATION:
EQUIPMENT: Unable to determine individual components from
PERSONNEL: total data processing systems.
OPERATION:

ADVICE: Review existing technology and software first and use what best fits your needs and hardware. Consider the comprehensive design of the complete accounting system--on-line student registration is just one component. Test the system and initially run a parallel system to ensure system reliability. In-service users on a regular basis. Set priorities and grow into the system gradually. Be prepared for modifications as use increases.

STUDENT PLACEMENT: ON-LINE PLACEMENT SYSTEM

FEATURES: Immediate service to employers within 24 hours of employment notification and service to students knowing which employers are hiring students.

BENEFITS: Same as above.

BARRIERS: None

POPULATION SERVED: Students, staff, employers and prospective students.

COST RANGE
INSTALLATION: Software design: $750
EQUIPMENT: CRT, $1,650
PERSONNEL:
OPERATION:

STUDENT PROGRESS TRACKING

FEATURES: Maintain status of students' progress of completing degree and courses needed to graduate.

BENEFITS: Provides information to allow accurate/complete advising of individual student progress. Ability to see instant changes to student records. Time saving.

BARRIERS: Dealing with old and inactive records.

POPULATION SERVED: 6,000 to 26,000 per year

COST RANGE

INSTALLATION:
EQUIPMENT:
PERSONNEL:
OPERATION:

Costs for individual components cannot be determined but operational costs represent a net savings because many of the functions of the APR were formerly done manually.

ADVICE: Provide for additional fields in data base for needs not anticipated. Plan carefully for system that does what is needed.

TELEPHONE REGISTRATION

FEATURES: Persons can register for courses, programs, seminars, etc., from their home, place of work, etc., using the telephone.

BENEFITS: This technology saves students time and mileage compared to on-campus registration. They can obtain immediate feedback regarding the status of a course offering. An increase in accuracy of registration data results as compared to input from hard copy registrations. Office staff is now free to continue other routine duties.

BARRIERS: One barrier is acceptance by the center supervisors and students that it is accurate and not intimidating. Students must be oriented to the fact that registration is not complete until the fee is paid even though the student has completed all of the other items on the registration form.

POPULATION SERVED: Primarily persons (nontraditional) enrolling in adult, part-time, or off-campus courses use this registration method. Others use it as well but not the high percentage.

COST RANGE

INSTALLATION:	$800 to $2,000 (telephone extensions for specific time periods)
EQUIPMENT:	$480 to ? (telephone work station(s))
PERSONNEL:	$700 per semester to ? (part-time operators)
OPERATION:	$110 per semester to ?

ADVICE: It is important to inform all persons of current procedures/steps in the registration process. Beginning with several centers and expanding helps in implementing the system smoothly. It is important to have registration personnel adequately trained in the process. The computer system and programs must be adequate to handle the rate, volume, and variety of listings.

TELEPHONE SYSTEM - DIMENSION/HORIZON/MITEL TELEPHONE SYSTEM

FEATURES: Phone system

BENEFITS: Fast, effective phone and data communications and inter-campus communications.

BARRIERS: Overcoming installation and hook-up of phone systems, lines, modems with multi-vendors due to divestiture of AT&T.

POPULATION SERVED: All staff

COST RANGE
- INSTALLATION: Included with equipment purchase
- EQUIPMENT: Dimension ($100,000) - Horizon ($40,000) - Mitel ($14,000)
- PERSONNEL: Communications manager salary
- OPERATION: About $92,000 per year

ADVICE: Requires a very knowledgeable person in the field of communications to evaluate purchase options and implement such systems. Evaluate all competing companies. Keep good cost records and follow-up on questionable billings.

VOCATIONAL TELEPHONE NETWORK (VTN) NETWORK

FEATURES: A communication network is made available through use of dedicated telephone lines, conveners/speaker boxes, microphones and speaker phones.

BENEFITS: It is a less costly alternative to traveling to centralized meetings.

BARRIERS: The cost of equipment, dedicated lines and operation.

POPULATION SERVED: Teachers, administrators, researchers, curriculum developers, and others are served.

COST RANGE
- INSTALLATION: About $2,400 per district in 1981
- EQUIPMENT: Included in installation cost
- PERSONNEL: Minimal for coordinating the conference and setting up equipment for the conference
- OPERATION: About $2,300 annually for line charges and session costs

ADVICE: Apprise faculty and staff of the services and promote the use of the network.

STUDENTS

COMPUTERIZED CAREER EXPLORATION & DECISION MAKING: I.E., DISCOVER AND MESA

FEATURES: Types of programs vary per seven reporting districts. In general, it is a computerized system of evaluating an individual's abilities and interests in training and/or career planning.

BENEFITS: Readily accessible, flexible, instant retrieval of occupational information with hard copy available. Self-paced to student need.

BARRIERS: Usual user resistance to new technology. The high costs of updating. There are some hardware/software programming bugs.

POPULATION SERVED: Seven reporting districts ranged from an annual low of 200 students (for a new program) to a high of 3,000.

COST RANGE ---Varies widely per seven reporting districts---

- **INSTALLATION:** Included in equipment acquisition.
- **EQUIPMENT:** Software and hardware combined (in some cases) ranged from $2,000-$5,000.
- **PERSONNEL:** $30,000 listed for one district. The rest listed none/minimal.
- **OPERATION:** Annual maintenance agreements ranged from $400 to $35,000.

ADVICE: Investigate all the various computerized career exploration systems, see potential system demonstrated and compare to needs. Check for special prices on purchases for schools, arrange to get technical advice from software vendor, and be sure to include in-service as part of the bid. Continuous updating of job factors and of norming data necessary.

COMPUTERIZED STUDENT ASSESSMENT

FEATURES: The assessment utilizes the computer to identify levels of abilities, aptitudes, and interests and make comparisons with those found in persons who are able to perform well in given careers. The assessments can be completed and provide persons with immediate feedback.

BENEFITS: Consistent assessments are made. Assessments are accomplished quickly and in an interesting manner. The results can be compared to instructor or employer criteria/standards and reports generated by the computer.

BARRIERS: The barrier listed most often was the fear of the computer by the client being assessed. "Bugs" in the software, lack of durability of materials, poor documentation, the need for evaluator training, and the small number of clients who can be assessed at one time were also listed.

POPULATION SERVED: Clients include individuals needing retraining (i.e, JTPA, handicapped, special needs, dislocated, etc.).

COST RANGE

INSTALLATION:	$ 94 to $ 1,600
EQUIPMENT:	$1,200 to $ 8,000
PERSONNEL:	$ 500 to $30,000
OPERATION:	$ 500 to $35,000

ADVICE: "Real World" information must be used. Use simple, non-educational linguistics. The vendor or other users should provide training for those staff to be administering the programs. The computerized assessment should be only one of several assessments being used.

OTHER

COMPUTERIZED LIBRARY HOLDING LIST

FEATURES: Record of film vendors with ability to update this list. Access to information as is currently available in the card catalog with ability to print.

BENEFITS: Film renting process fast and complete. Access to LRC collection.

BARRIERS: Fear of usage by patron and LRC staff.

POPULATION SERVED: 50 instructors

ADVICE: It is important to stress the need for accurate and detailed information. Work closely with and have the support of the data processing department and make them aware of exactly what needs to be accomplished and the reasons for it. Talk to people who have an operating program and learn from them, thereby eliminating many problems and wasting time.

PROVIDE UNION LIST FOR 25 HEALTH/SCIENCE LIBRARIANS

FEATURES: A union list of periodicals for 25 area health science libraries is available by title and/or individual library holdings.

BENEFITS: Lists are updated annually and used for inter-library loan purposes.

BARRIERS: The need for accurate and detailed input information.

POPULATION SERVED: Twenty-five health science libraries in the following VTAE districts: Northeast Wisconsin, Fox Valley, Moraine Park, and Lakeshore.

COST RANGE
INSTALLATION:
EQUIPMENT: Costs not available
PERSONNEL:
OPERATION:

ADVICE: Work closely with data processing personnel and talk with people who have an operating system.

IV. CONCLUSIONS

The following conclusions are based on findings appearing in the table in Section II entitled "Extent to Which VTAE Districts have Implemented Electronic Technologies." These conclusions exclude all write-in technologies (technologies having one response).

1. There were 78 different applications of various technologies in various stages of implementation in the 16 responding VTAE districts.

2. Based on a scale of 1 to 5, ranging from "Not Considering" to "Researching," "Experimenting," "Operationalized" and "Significant Experience" in the technology, the overall top applications were Word Processing, Centralized/Decentralized; Computer-Assisted Design; Optical Scanner Applications in Grading, Testing, etc.; On-Line Student Registration; and Internal Closed System/Classroom Educational Television.

3. The technologies with the lowest extent of implementation were Call-Up Educational Programming, Work Cells Used in Instruction, Instructional Television Fixed Service (ITFS), Computer Conferencing and Computerized Learning Styles Mapping.

4. In instructional delivery, the technologies most highly implemented were Satellite Conferencing, Internal Closed System/Classroom, Cable TV, and Computer Based Instruction. Those technologies least implemented were Interactive Televideo, Interactive Computer-TV, Instructional Television Fixed Service (ITFS) and Computer Conferencing.

5. In instructional applications, the most highly implemented technologies were Computer Assisted Design; Microcomputer Networks; and Optical Scanner Applications in Grading, Testing, etc. Those technologies least implemented were Work Cells in Instruction and Call-Up Educational Programming.

6. In administrative support applications, the most highly implemented technologies were Word Processing, Centralized/Decentralized; On-Line Student Registration; Facility Energy Management Systems; Telephone Registration; and Electronic Mail. Those technologies least implemented were Computerized Facility Sharing and Electronic Calendaring.

7. In student support applications, the most highly implemented technologies were Computerized Career Exploration and Decision Making and Computerized Student Assessment. The least implemented technology was Computerized Learning Styles Mapping.

8. All but one district have operationalized and/or have significant experience with at least one Instructional Delivery Technology Innovation.

9. About one-half of the districts have operationalized and/or have significant experience with at least six instructional delivery technological innovations.

10. All VTAE districts are researching or experimenting with at least one Instructional Delivery Technological Innovation.

11. All VTAE districts have operationalized and/or have significant experience with at least two Instructional Applications of Technological Innovations.

12. About one-half of the VTAE districts have operationalized and/or have significant experience with at least four Instructional Applications of Technological Innovations.

13. Nearly all of the VTAE districts are researching or experimenting with at least two Instructional Applications of Technological Innovations.

14. All of the VTAE districts have operationalized and/or have significant experience with at least one Technological Innovation for Support Applications.

15. Approximately one-half of the districts have operationalized or have significant experience with at least four Technological Innovations for Support Applications.

16. Nearly all VTAE districts are researching or experimenting with at least two Technological Innovations in Support Applications.

DH:sb/DOTI

APPENDIX A

WISCONSIN VOCATIONAL, TECHNICAL AND ADULT EDUCATION DISTRICTS

Area VTAE District No. 4 (Mdsn)
211 N. Carroll
Madison, WI 53703
(608) 266-5100

Blackhawk VTAE District (Blkhk)
6004 Prairie Road, P.O. Box 5009
Janesville, WI 53547
(608) 756-4121

Fox Valley VTAE District (Fox V)
1825 N. Bluemound Dr., P.O. Box 2277
Appleton, WI 54913
(414) 735-5600

Gateway VTAE District (Gtwy)
3520 30th Avenue
Kenosha, WI 53141
(414) 656-6900

Lakeshore VTAE District (Lkshr)
1290 North Avenue
Cleveland, WI 53015
(414) 458-4183

Mid-State VTAE District (Mid-St)
500 32nd Street North
Wisconsin Rapids, WI 54494
(715) 423-5650

Milwaukee Area VTAE District (Milw)
1015 N. 6th Street
Milwaukee, WI 53203
(414) 278-6600

Moraine Park VTAE District (Mor Pk)
235 North National Avenue
Fond du Lac, WI 54935
(414) 922-8611

Nicolet VTAE District (Nic)
P.O. Box 518
Rhinelander, WI 54501
(715) 369-4410

North Central VTAE District (N Cen)
1000 Campus Drive
Wausau, WI 54401
(715) 675-3331

Northeast Wisconsin VTAE District (NE Wis)
2740 W. Mason St., P.O. Box 19042
Green Bay, WI 54307
(414) 498-5400

Southwest Wisconsin VTAE District (SW Wis)
Bronson Boulevard
Fennimore, WI 53809
(608) 822-3262

VTAE District One (One)
620 W. Clairemont Avenue
Eau Claire, WI 54701
(715) 836-3900

Waukesha County Area VTAE District (Wauk)
800 Main
Pewaukee, WI 53072
(414) 691-5566

Western Wisconsin VTAE District (W Wis)
304 N. 6th Street, P.O. Box 908
La Crosse, WI 54602
(608) 785-9200

Wisconsin Indianhead VTAE District (Indnhd)
P.O. Box B
Shell Lake, WI 54871
(715) 468-2815

Wisconsin Board of VTAE
310 Price Place, P.O. Box 7874
Madison, WI 53707
(608) 266-1207

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